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More Than You Can Handle

Decentralization and Spending Ability of Peruvian Municipalities

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Abstract

In the past three decades, emerging countries have gone through extensive decentralization reforms. Yet, there are no studies assessing quantitatively the relative importance of various factors known to affect the success of decentralization. This paper builds on a comprehensive dataset the authors constructed for Peru, which merges municipal fiscal accounts with information about municipalities' characteristics such as population, poverty, education, and local politics. The paper then analyzes the leading factors affecting the ability of municipalities to execute the allocated budget using complementary methodologies, from least squares to quantile regression analyses. According to the existing literature and the Peruvian context, the analysis divides these factors into four categories: the *budget size and allocation process; local capacity; local needs;* and *political economy constraints.* Although all four factors affect decentralization, the largest determinant of spending ability is the adequacy of the budget with respect to local capacity. The results confirm the need for decentralization to be implemented gradually over time in parallel with strong capacity building efforts.

This paper is a product of the Poverty Reduction and Economic Management Unit, Latin America and the Caribbean Region. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at jrigolini@worldbank.org.

More Than You Can Handle

Decentralization and Spending Ability of Peruvian Municipalities [1]

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The World Bank

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I. Introduction

In the last three decades, emerging countries have gone through extensive decentralization reforms that devolved fiscal and administrative authority to regional and local governments. The underlying and widespread belief behind these reforms is that local jurisdictions remain "more accountable" to the people and are in a better position to understand and address the needs of the local population (Oates, 1999). But little is understood about how a decentralization program should be sequenced and implemented (Bahl and Martinez-Vazquez, 2006). Political economy considerations have often pushed for rushed implementation, leaving little space for experimenting and tailoring, and leading to mixed successes. In sum, evidence of a positive impact of decentralization reforms in low and middle income countries remains mixed (Smoke, 2001).

Recent analyses that studied decentralization reforms suggest that decentralization requires a significant set of prerequisites that are often lacking in developing countries (Bardhan and Mookherjee, 2006). Prerequisites include educated and politically aware voters, the prevalence of law and order, fair election and effective political competition, a capable local administration, and the prevalence of effective oversight mechanisms. Because of data constraints, most studies on fiscal decentralization remain however of qualitative nature, or only consider selected constraints to decentralization abstracting from the broader context. Yet, while there are many factors affecting decentralization, some are bound to be more important than others, but to the best of our knowledge no study has yet compared the relative importance of each prerequisite in affecting decentralization outcomes.

This paper attempts to disentangle how different factors such as institutional capacity, political economy, and structural characteristics are playing out in the decentralization of spending to local governments (in particular municipalities) in Peru. The paper builds on a comprehensive dataset we have constructed that merges municipal fiscal accounts with information at the municipal level about municipalities' characteristics such as population, poverty, education and local politics to analyze leading factors affecting the outcomes of the decentralization process. We conduct the empirical analysis using complementary statistical

methodologies, from least squares to quantile regression analyses.

Drawing from experience in other Latin American countries, officials in Peru attempted to cope with some of the pitfalls of decentralization reforms by imposing strong fiduciary requirements to local governments, and, to guarantee local and transparent planning, designed guidelines on participatory budgeting that require elected municipal authorities to consult with civil society in planning the budget. As a result, many municipalities are struggling to abide with the complexity of the newly drafted regulation and often do not manage to spend the budget that has been allocated to them. The Peruvian decentralization process contrasts therefore with the outcomes of reforms in other countries, where the main issue often relates to irresponsive spending due to soft budget constraints (Rodden *et al.*, 2003). Because of its peculiarity, it allows studying with greater precision factors that under soft budget constraints and excessive spending may be difficult to identify.

We classify constraints to municipalities' spending ability into four broad categories, in accordance with both the existing literature, and the Peruvian context: the *budget size and allocation process; local capacity*; *local needs*; and *political economy constraints*. The importance of capacity and political economy constraints in influencing decentralization outcomes has been widely discussed in the literature (see below, next section, for details): poor capacity of the local administration and local elite capture are almost always cited as the leading culprits of failed decentralization reforms. In addition, because of the design of the reform and the massive amounts of resources that have been channeled to municipalities, in the Peruvian context the size of the budget and the related allocation process also affect considerably spending ability. Finally, "local needs" reflects the degree of development, and the easiness with which municipalities can identify projects that are smaller in scale and can be realized more rapidly. The large variation in the demonstrated ability to spend across the 1834 municipalities in Peru will provide an invaluable testing ground for assessing the relative relevance of each factor.

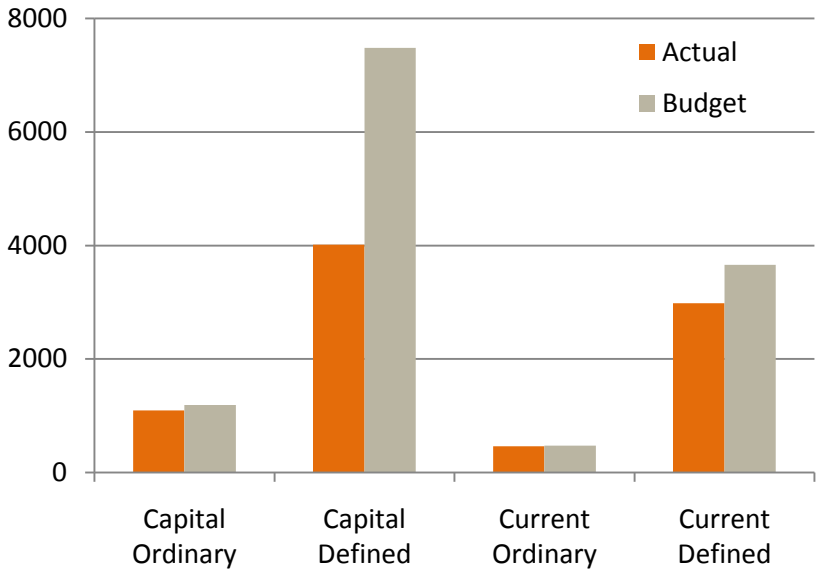
The paper proceeds as follows. The next section discusses the Peruvian decentralization reform and the related literature. Section III discusses the data sources and the methodology; Section IV presents the empirical results; and Section V concludes.

II. Context and literature

The Peruvian decentralization process began relatively late, with the 2002 Constitutional reform. To avoid the fiscal crises that had plagued earlier episodes of decentralization in Latin America, decentralization in Peru was heavily anchored around fiscal neutrality. The ability to borrow of sub-national governments (which include regions, provinces and municipalities) was strictly limited by law, and the central government imposed strong fiduciary requirements for spending (such as the need to submit proposals and receive clearance from the central government for large capital investments). For municipalities, a law on participatory budgeting was also passed requiring local authorities, who are elected every four years, to consult each year with their constituency and civil society in planning the budget. However, in part because of rushed implementation, few mechanisms have been put in place to oversee and train municipalities in local administration practices. As a result, municipalities have been somewhat "left on their own," and while some have thriven, many municipalities are struggling to spend the budget that has been allocated to them. Depending on the source and type of funds, municipalities spent in 2009 an average of between 63 and 97 percent of the allocated budget (Figure 1).

There is however a great variation in municipal spending rates depending on the type and source of funds. Municipalities spend quite a significant amount of the budget allocated for current expenditures (on average, 88 percent of it), while they spend lower amounts of their allocation for capital expenditures. And spending records vary even more significantly by source of funds: most municipalities spend most of the "ordinary" budget that has been allocated to them, but they lag behind in spending the "defined" (or earmarked) allocation, to which the majority of allocated funds for capital expenditures tend to belong. The reason for this difference in spending rates is apparent given the key distinction between ordinary and defined sources of funds: if the ordinary budget remains unspent at the end of the year it is returned to the central government, while the defined budget can be carried over for next year.

Figure 1: Average Actual Expenditures vs. Allocated Budget per Municipality, 2009



Note: Data are in thousands Nuevo Soles. As of December 31, 2009, 1 Peruvian Nuevo Sol = 0.35 US Dollar. Source: Authors' calculations based on data from Ministry of Economics and Finance (MEF).

There is also considerable variability in municipalities' spending patterns (Figure 2), which do not display any geographic trends: municipalities that are (not) able to spend their budget appear to be scattered all across the territory, from the Amazon basin, to Lima, and from North to South. The lack of a clear-cut pattern is all the more surprising given the geographic clustering of poverty and other factors such as natural resources that may affect governance and political factors.

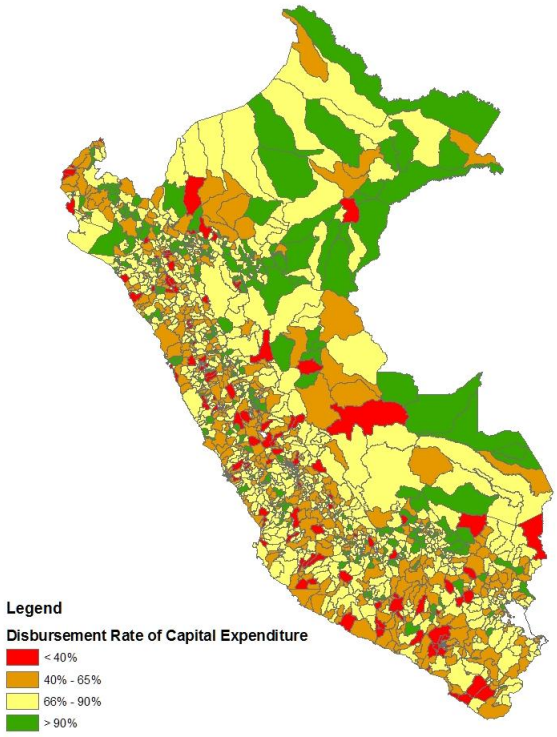
In studying determinants of spending ability, we draw both from existing literature and the Peruvian context. We classify constraints to spending into four broad categories: the budget size and allocation process; local capacity; local needs; and political economy constraints. Both the academic and policy literature have widely documented the extent to which capacity constraints and political economy considerations can significantly hamper the ability and willingness of local administrations to address the needs of their electorates. Poor capacity of local administrations has long been identified as an important bottleneck for successful

decentralization (Smoke and Lewis, 1996; Litvack *et al.*, 1998) and, accordingly, qualitative reviews of decentralization processes point out that many early decentralization efforts have failed because local administrations have been given "too much functional responsibility too rapidly and without appropriate capacity building" (Smoke, 2001). More recent quantitative evaluations also find that outcomes such as household consumption and school enrolment are positively related to capacity of local governments (Steiner, 2010).

Political economy constraints to decentralization have been subject to an even wider academic and policy scrutiny. It is by now widely recognized that local capture, favoritism, electoral dynamics, power struggles between central and local politicians and agencies, and inter- and intra-party dynamics all affect the design and success of decentralization reforms (see, among others, Bardhan, 2002; Reinikka and Svensson, 2004; Bardhan and Mookherjee, 2006; Olken, 2007; Araujo *et al.*, 2008; Boetti, 2009; and the review in Eaton *et al.*, 2010).

The Peruvian case appears to be no exception, and anecdotal evidence suggests strong capacity and political constraints to spending. Visits to municipalities in the regions of Ayacucho, Arequipa and in Lima that we have conducted in the context of this research, as well as conversations with leading policymakers, confirmed for instance that small municipalities are not able to afford the fixed investment of a qualified engineer that supervises project design, tendering and implementation. The size and sophistication of projects may also affect spending, though *a priori* the effect remains ambiguous since larger projects may be more difficult to implement, but at the same time consume a larger share of the budget. Similarly, the visits suggested that high political fractionalization leads members of the municipal council to question in public and block some of the mayors' investment proposals. Because of the focus on spending ability, however, binding political constraints to spending may differ from the ones identified by the existing literature. In particular, elite capture may not play such a relevant role as opposed to studies that look at the governance of decentralization (Araujo *et al.*, 2008).

Figure 2: Map of Budget Execution Rates of Capital Expenditures, 2009



Source: Authors' calculations based on MEF data.

While capacity and political economy considerations have been widely studied, the extent to which the budget size and allocation process, as well as needs, affect spending has been less investigated, in part because these features are more specific to the design of the Peruvian decentralization reform. Although they do relate to some extent to capacity, they have relevance on their own: in fact, our empirical analysis suggests that budget-related issues, in particular the adequacy of the transferred budget with respect to the local capacity, are among the most important determinants of spending ability. This is of particular relevance for Peru, since capacity building and planning are long term investments, but the recent boom in commodity prices and generous revenue sharing agreements have spurred transfers to some municipalities that may simply not be able to manage the sudden increases in revenues.

Because of some peculiar features of the Peruvian decentralization reform,

municipalities' needs may also affect spending ability. Our visits suggested that communities with more basic needs may find it easier to identify their needs during stakeholders' consultations, and that the types of projects implemented in these municipalities may ease spending since they tend to be smaller, and of simpler design.

In spite of the strong attention that fiscal decentralization has received in the academic and policy literature, existing quantitative studies limit themselves at looking at specific constraints, and fail to assess the relative importance of the various factors highlighted above. On the other hand, more comprehensive studies reviewing factors affecting decentralization, which tend to be more of a policy nature (see, among many, Smoke, 2001; Tanzi, 2001; and Eaton *et al.*, 2010), remain for the most part qualitative. In this paper we bridge these two strands of literature by assessing quantitatively the relative importance of each factor in determining spending ability. In looking at spending ability, our research also complements existing literature looking at the extent to which various factors, such as gender, elite capture, or revenues from natural resources affect the type of spending (Chattopadhyay and Duflo, 2004; Araujo *et al.*, 2008; Caselli and Michaels, 2009) and spending efficiency (De Borger and Kerstens, 1996; García-Sánchez, 2006; and Balaguer-Coll *et al.*, 2007). While it would be of great interest to complement the analysis of spending ability with information on spending efficiency, to the best of our knowledge these data currently only exist for high income countries.

III. Data

The analysis draws on a combination of particularly rich databases containing information at the municipal level. For each of the more than 1,830 municipalities in Peru we have information on public spending undertaken by the municipality, population, staffing levels at the municipality, poverty, reported social conflicts, and a number of features of the political process.

The public expenditure data at the municipal level is particularly detailed. For each municipality in Peru we have available the budgeted public spending as well as the actual public spending outlays for 2007 through 2009. While information is in principle available

disaggregated by month in the course of a given year we chose to use only annual aggregates; the reason for this decision is the fact that most capital expenditure is concentrated towards the end of the year and as a result comparing periods other than full years would be misleading. This information is available for a large number of possible cuts, in particular disaggregated by type of spending (i.e. current vs. capital expenditures). Crucially, this information is available disaggregated for expenditures that are financed with resources that have different types of restrictions attached to them. A particularly important distinction in the Peruvian context is that between 'ordinary' and 'defined' resources. If unspent at the end of the year ordinary resources revert back to the central government. In contrast, if defined resources are unspent at the end of the year the balance gets reallocated to the municipality in the following year's budget. This is relevant because all revenues related to natural resources shared between the different levels of governments by formula are included among the defined resources. This municipal public expenditure data has become available due to the roll out of the Integrated Financial Management System (*Sistema Integrado de Administración Financiera, SIAF*) in all municipalities in Peru and is currently available on-line – a key element in improving accountability to citizens (http://transparencia-economica.mef.gob.pe/amigable/). The Ministry of Economy and Finance kindly provided the data, including for the years in which SIAF's information was not made available on-line.

Population data are from the 2007 Census. In addition to the total number of inhabitants per municipality we also know the number of so-called 'populated centers' within a given municipality and the number of people living in each of those populated centers. This allows us to exploit the information content in the dispersion of population within a given municipality.

The human resources of each municipality are available through the annual National Registry of Municipalities (*Registro Nacional de Municipalidades, RENAMU*), a census of municipalities run by the National Institute of Statistics. This registry allows us to know not only the total number of staff working in a given municipality but also the type of work they perform, whether it is managerial, administrative and technical, or manual and support work.

The living standards of the population in a given municipality are available thanks to the work produced by World Bank staff for operation purposes using the Poverty Maps

methodology (Elbers *et al.*, 2003) by combining the 2007 *Encuesta Nacional de Hogares sobre Condiciones de Vida* and 2007 Census data. This allows us to obtain estimates of poverty incidence at the municipal level. The same sources of information and methodology also allow us to obtain estimates of the average education attainment of the population living in each municipality.

Finally, the *Jurado Nacional de Elecciones* (www.jne.gob.pe), the public organization in charge of organizing and coordinating electoral processes, kindly made available to us information on a number of characteristics pertaining to the political landscape within each municipality. We have information on the name, political affiliation, and education of the elected mayor in each municipality for the 2006 elections. In addition, we know the share of the vote that the elected mayor received, as well as of all other candidates standing in the mayoral race. We also have this information for the 2002 electoral cycle, which allows us to know if a given mayor was an incumbent when elected in 2006.

IV. Setup and results

We regress the percentage of the allocated budget that is actually spent (or execution rate) by each municipality in 2007, 2008 and 2009 on local characteristics that capture the main hypotheses under consideration – namely, issues related to budget size and allocation process, local capacity, local needs, and political economy. We do so for all fiscal expenditures, capital and current expenditures, and defined capital expenditures alone. We focus most of the analysis, however, on the latter because it is the component of the budget with the lowest rate of execution. Our basic specification is as follows:

$$Execut_{it} = \alpha_0 + \alpha_1 \ln(Budget_{it}) + \alpha_2 NR\ Share_{it} + \alpha_3 \ln(Pop_i) + \alpha_4 Edu_i + \alpha_5 Staff_{it}$$
$$\alpha_6 Pov_i + \alpha_7 Urban\ Pop_i + \alpha_8 Votes_i + \alpha_9 Incumb_i + \alpha_{10} Dispersed_i + \mu_t + \varepsilon_{it}$$

Where, $Execut_{it}$ represents the budget execution rate by municipality *i* in year t, $Budget_{it}$ is

allocated budget, $NR\ Share_{it}$ the share of the allocated budget that comes from the exploitation of natural resources, Pop_i total population in 2007, Edu_i the average number of years of schooling of the population aged 15 and older in 2007, $Staff_{it}$ the number of white-collar personnel as percentage of total population, Pov_i the poverty rate in 2007, $Urban\ Pop_i$ the percentage of urban population in 2007, $Votes_i$ the percentage of winning votes of the elected mayor in the 2006 elections, $Incumb_i$ a binary variable of value 1 if the elected mayor is an incumbent, and μ_t year-specific effects. Spending data cover all 1,834 Peruvian municipalities; however, because of other data missing, the final sample consists of an unbalanced panel of 1,688 municipalities and 3 years of data (rendering 4,858 observations).

The basic estimation methodology is ordinary least squares regression (OLS) with robust standard errors, clustered by province (a political demarcation of adjacent districts/municipalities). The results are robust to the use of weighted least squares regression (WLS) and median regression (MR) that controls for the influence of outliers. In addition, we apply quantile regressions (QR) in order to allow the estimated effects to vary according to the degree of budget execution.

Table 1 presents the basic OLS regression results for total spending, for spending disaggregated by current and capital expenditures, and for defined capital expenditures. In what follows, we organize the discussion of results using the framework introduced above, which separates the determinants of the budget execution rate along the issues of the budget size and allocation process, local capacity, local needs, and political economy constraints.

Let us first discuss the variables related to the budget. A larger allocated budget is significantly related to a lower execution rate; and this is the case for both total and disaggregated expenditures, with a larger effect on capital than current expenditures. Thus, it seems to be harder to spend a larger budget, especially when this requires planning, project preparation, and implementation capacity. The budget share of natural resource revenues has an ambiguous impact on the execution rate of total expenditures. This ambiguity is, however, clarified once expenditures are disaggregated. While for current expenditures the share of natural resource revenues has a significantly negative impact on the budget execution rate, for capital expenditures this impact is significantly positive. This can be explained by the fact that

Table 1: Basic Determinants of the Municipal Budget Execution Rate

	Dependent Variable: Actual Expenditure / Allocated Budget (%)			
Explanatory variables:	Total	Current	Capital	Capital Defined
Allocated Budget (LCU, in logs)	-12.5127*** (-9.71)	-5.9494*** (-5.95)	-12.0434*** (-11.21)	-13.0507*** (-14.22)
Budget from Natural Resources (% of actual expenditure)	0.0340 (1.03)	-0.0714*** (-6.93)	0.1363*** (4.62)	0.3185*** (9.99)
Population (in logs)	7.4230*** (10.38)	4.4466*** (5.75)	4.6245*** (7.37)	7.0719*** (11.59)
Education (average years of schooling, population over 15 years old)	1.4839*** (3.26)	0.9050*** (2.86)	1.3852*** (2.84)	1.1866** (2.26)
Staff / Population (ratio of white-collar staff in municipality to population, %)	4.3735*** (4.20)	2.8201*** (3.20)	2.0742** (2.36)	3.2371*** (3.16)
Poverty Rate (% of total population)	0.0311 (1.50)	0.0334*** (2.74)	0.0829*** (3.64)	0.0936*** (4.18)
Urban Population (% of total population)	-0.0778*** (-3.24)	-0.0411*** (-2.88)	-0.0483** (-2.50)	-0.0573*** (-2.65)
Percentage of Winning Votes (% of votes obtained by winning Mayor)	0.1963*** (4.79)	0.0540** (2.11)	0.2060*** (4.43)	0.1965*** (4.12)
Population Dispersion (1 – normalized Herfindahl index of population in villages)	-10.4850*** (-3.26)	-5.6197*** (-3.67)	-2.5238 (-1.08)	-3.4284 (-1.49)
Incumbent Mayor (dummy variable = 1 if incumbent, and 0 otherwise)	-1.1441 (-1.53)	-0.5936 (-1.09)	-0.9901 (-0.93)	-1.4643 (-1.43)
Incumbent Mayor * Year Effect 2007	5.3229*** (6.38)	2.2826*** (4.06)	7.1728*** (6.60)	8.3761*** (7.64)
Year Effect 2007 (dummy variable = 1 if year is 2007, and 0 otherwise)	-6.5215*** (-10.57)	-0.0071 (-0.02)	-10.3776*** (-12.28)	-7.7757*** (-8.38)
Year Effect 2009 (dummy variable = 1 if year is 2009, and 0 otherwise)	0.1366 (0.24)	-4.2505*** (-10.49)	1.4315** (2.18)	-4.3182*** (-6.00)
Constant	200.1311*** (17.56)	134.3912*** (17.67)	194.8805*** (16.27)	177.9881*** (18.54)
R-squared	0.289	0.204	0.269	0.230
No. of observation / No. of municipalities	4858 / 1688	4858 / 1688	4858 / 1688	4858 / 1688

Numbers in parentheses are the corresponding robust t-statistics. Standard errors are clustered by province.
*, ** and *** denote significance at the 10 percent, 5 percent and 1 percent levels, respectively.

the budget linked to natural resource revenues is earmarked mostly for capital expenditures – earmarking encourages the intended type of expenditure, possibly at the expense of other types.

Second, let us turn to the determinants related to local capacity. Population size seems to have a significant effect on the budget execution rate for both total and disaggregated expenditures. Municipalities with larger populations have higher execution rates possibly because they can generate a better and more diversified set of projects and have a larger pool of able individuals and institutions to implement them. In a sense, population size is also related to the first set of determinants – on the magnitude of the budget – as larger populations can be better prepared to absorb and execute a given budgetary allocation. Another key variable determining local capacity is the level of education of the population. The results show that municipalities whose people have in average more years of schooling obtain higher budget execution rates. This result is statistically significant for both total and disaggregated expenditures. When we add to the set of explanatory variables an indicator of the educational level of the mayor (not shown in the table), its estimated coefficient and that of the average schooling of the municipality are positive but not statistically significant. The lack of significance comes in part from multicollinearity and in part from the much reduced sample of observations: Data on the mayor's education is self-reported and limited in coverage, cutting the sample to one-fourth and biasing it towards the municipalities with better educated mayors. An issue repeatedly highlighted in our interviews with municipal managers is the lack of necessary personnel. In order to address this issue, we include in the set of explanatory variables the number of white collar staff working in the municipality, as percentage of the population. Its coefficient is positive and statistically significant, indicating that municipalities that enjoy a larger professional staff obtain higher budget execution rates, for all kinds of expenditures.

The third set of determinants deals with the issue of local needs. The results may appear surprising at first but are consistent with the hypothesis that decreasing returns applies also to municipal projects. That is, other things being equal, more accomplished municipalities face a harder time finding worthy projects to undertake. Municipalities that have larger

poverty rates execute a larger fraction of their allocated budget. This result is not statistically significant for aggregate expenditures but is quite significant once these are disaggregated into current and capital expenditures. Judging by the size of the coefficients, poverty exerts a much stronger pressure to execute capital than current expenditures. Likewise, municipalities facing a lower degree of urbanization seem to execute a larger fraction of their allocated expenditures. This result is statistically significant for all types of expenditures, with slightly larger effects for capital expenditures. It is important to remark that these results apply *ceteris paribus*, that is, once we control for the budget size, local capacity, and political economy, discussed next.

Fourth, let us turn to political economy constraints. The level of popular support for local authorities is arguably a key factor in their ability to conduct their plans and, therefore, execute their budget. Indeed, the regression results show that municipalities where the mayor is elected with a larger share of the vote are able to spend a larger proportion of their allocated budget. The share of the winning vote is a particularly important variable in Peru because mayors are there elected with a simple majority, and in the fragmented Peruvian context mayors have won their election with as low as 7% of the vote. The positive effect of the share of the winning vote is statistically significant for both total and disaggregated expenditures, with a much larger estimated coefficient for capital than current expenditures. A different, yet related, political economy aspect is the degree to which the population within the municipality is integrated and has common objectives. There are various elements to this issue, but we focus on one that was repeatedly mentioned in our interviews with local authorities. This is the degree of geographic dispersion of the 'populated centers' (or villages) within the district. As expected, municipalities with a higher degree of population dispersion execute a lower fraction of their allocated budget. The corresponding coefficient is negative and statistically significant for total and current expenditures. In this basic model, it does not quite reach statistical significant for capital expenditures; however, in a more complete model (discussed below), population dispersion becomes a statistically significant determinant of budget execution for capital expenditures as well. Finally, we consider whether mayors who have been reelected – incumbents, for short – do a better job of executing the budget. Since this effect may be

different over the cycle of the municipal administration, we include an interaction between the dummy variable for incumbents and a dummy variable for 2007, the first year of the administration. While the coefficient on the incumbent variable by itself is not statistically significant, the coefficient on the interaction is negative and significant, with a much larger size for capital than current expenditures. It then appears that incumbent mayors execute a larger fraction of their budget than newly elected ones do, but only at the beginning of their term in office. There is indeed a cost of adjustment that new authorities have to undergo.

Table 2 presents three robustness exercises on the basic specification, focusing only on defined capital expenditures. In the first, we eliminate the year-to-year variation in the budget execution rate in order to focus on the overall performance per municipality. The dependent variable in this case is the sum of actual expenditures divided by the sum of allocated budget over the years 2007-09. The sign, statistical significance, and even size of most estimated coefficients are quite similar to those of the basic specification (compare Table 2 Col. 1 with Table 1 Col. 4). The exception relates to the indicator on incumbent mayor. In the basic specification it was relevant only in the first year, so it is not too surprising than when the three years are taken together, incumbent mayor carries an insignificant coefficient. The last two exercises attempt to control for the influence of outliers. In Col. 2 we present the basic specification estimated with a WLS procedure that weighs each observation proportionally to its goodness of fit (in an OLS regression that excludes it). In Col. 3 we present the basic specification estimated with a quantile regression procedure that approximates the conditional median of the dependent variable (given the values of the explanatory variables). The sign, statistical significance, and size of most estimated coefficients are similar to those estimated using OLS. There is one important exception. Under WLS, population dispersion is not only negative (as before) but also statistically significant. As seen below, this variable will also gain significance once we augment the model to account for other budget-related variables (see Table 3).

Table 2: Robustness

	Dependent Variable: Actual Expenditure / Allocated Budget (%)		
	Capital Defined		
Explanatory variables:	3-Year Sum	WLS	Median Regression
Allocated Budget (LCU, in logs)	-13.2908*** (-15.94)	-14.1117*** (-18.52)	-15.2196*** (-27.78)
Budget from Natural Resources (% of actual expenditure)	0.2753*** (9.04)	0.3397*** (12.75)	0.3637*** (17.79)
Population (in logs)	7.4584*** (12.63)	7.6935*** (14.50)	8.1937*** (17.83)
Education (average years of schooling, population over 15 years old)	1.2057** (2.43)	1.2295** (2.59)	1.6822*** (3.28)
Staff / Population (ratio of white-collar staff in municipality to population, %)	5.0913*** (3.18)	3.5782*** (4.07)	4.5523*** (5.55)
Poverty Rate (% of total population)	0.0805*** (3.74)	0.0939*** (4.63)	0.0927*** (4.70)
Urban Population (% of total population)	-0.0567*** (-2.69)	-0.0592*** (-3.10)	-0.0659*** (-3.28)
Percentage of Winning Votes (% of votes obtained by winning Mayor)	0.1853*** (3.89)	0.1939*** (4.87)	0.2106*** (5.39)
Population Dispersion (1 – normalized Herfindahl index of population in villages)	-3.3564 (-1.40)	-3.6300* (-1.76)	-3.5667 (-1.56)
Incumbent Mayor (dummy variable = 1 if incumbent, and 0 otherwise)	1.0641 (1.19)	-1.3956 (-1.56)	-1.8064* (-1.80)
Incumbent Mayor * Year Effect 2007		8.7415*** (8.99)	10.7903*** (6.27)
Year Effect 2007 (dummy variable = 1 if year is 2007, and 0 otherwise)		-8.0574*** (-9.98)	-7.9973*** (-8.83)
Year Effect 2009 (dummy variable = 1 if year is 2009, and 0 otherwise)		-4.3791*** (-6.96)	-4.2226*** (-5.25)
Constant	190.9864*** (19.47)	187.8408*** (23.64)	197.6846*** (32.36)
R-squared (Pseudo R-squared for col. 3)	0.339	0.280	0.137
No. of observation / No. of municipalities	1688 / 1688	4858 / 1688	4858 / 1688

Numbers in parentheses are the corresponding robust t-statistics. Standard errors are clustered by province for columns 1 and 2. *, ** and *** denote significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Next, we conduct quantile regression analysis in order to examine whether the effects of the explanatory variables vary according to the rate of budget execution. Figure 3 presents a graphical exposition of the results. It shows one panel per explanatory variable in the basic specification; in each of them, the X-axis represents the percentiles of the dependent variable, and the Y-axis measures the effect of the corresponding explanatory variable. The solid line displays the estimated coefficients at each percentile of the dependent-variable distribution, with corresponding 90-percent confidence bands; and, for comparison purposes, the dotted line indicates the respective OLS coefficient.

Quantile regression results are interesting to the extent that they differ from the mean (OLS) or median effects. This is the case for the variables on allocated budget, budget from natural resources, population, poverty rate, incumbent mayor in the first year, and year 2007. In these cases, we see a pattern of effects that varies clearly and significantly along the distribution of the budget execution rate. The general, systematic result for these explanatory variables is that the magnitude (i.e., absolute value) of their effects is larger when the budget execution rate is smaller. This result underscores the importance of these factors especially when budget execution is weak. For the other variables –education, municipal staff, urban population, percentage of winning votes, population dispersion, and year 2009—the quantile effects are not statistically different to the mean (or median) effects.

Figure 3: Quantile Regression on Basic Specification

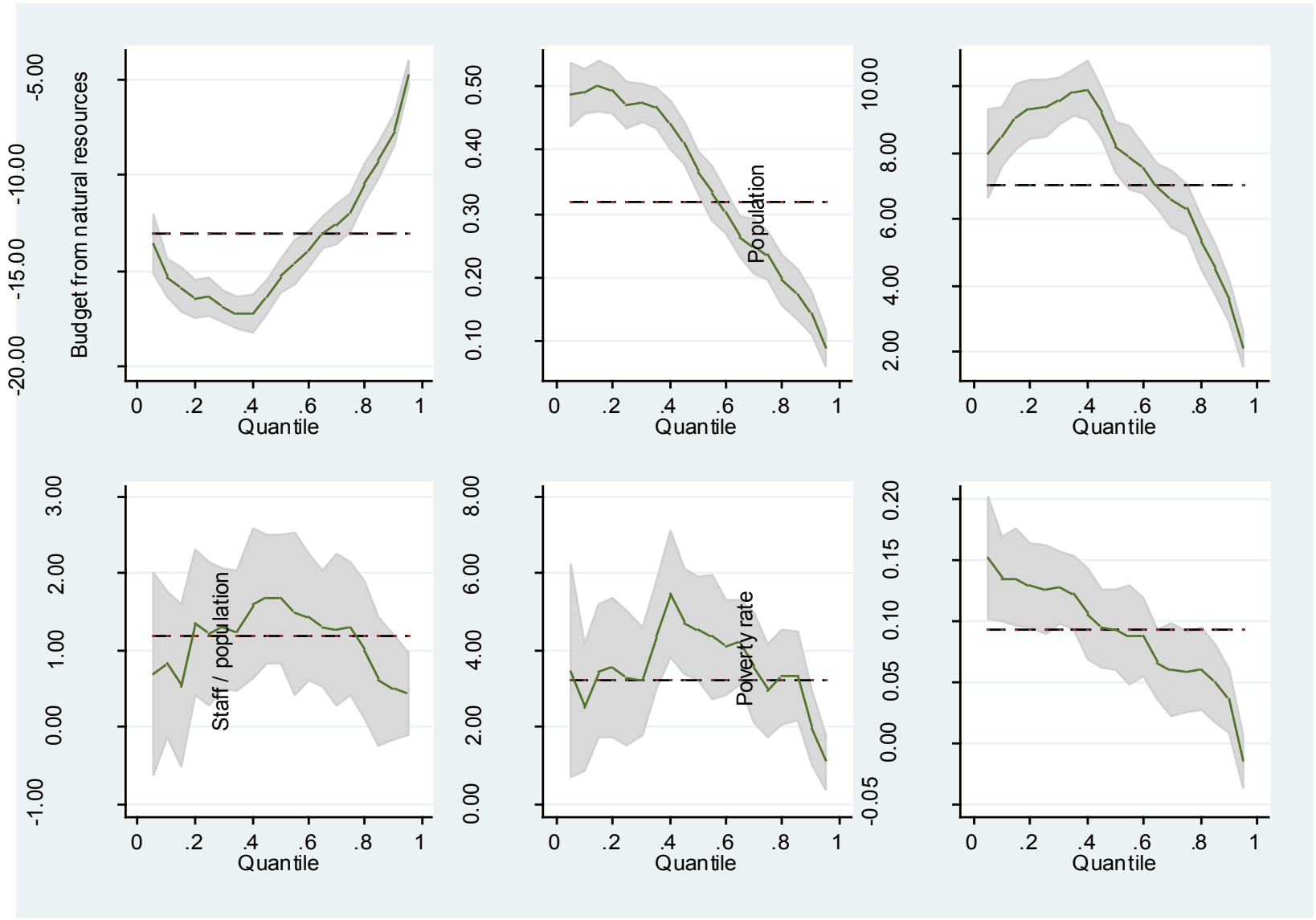
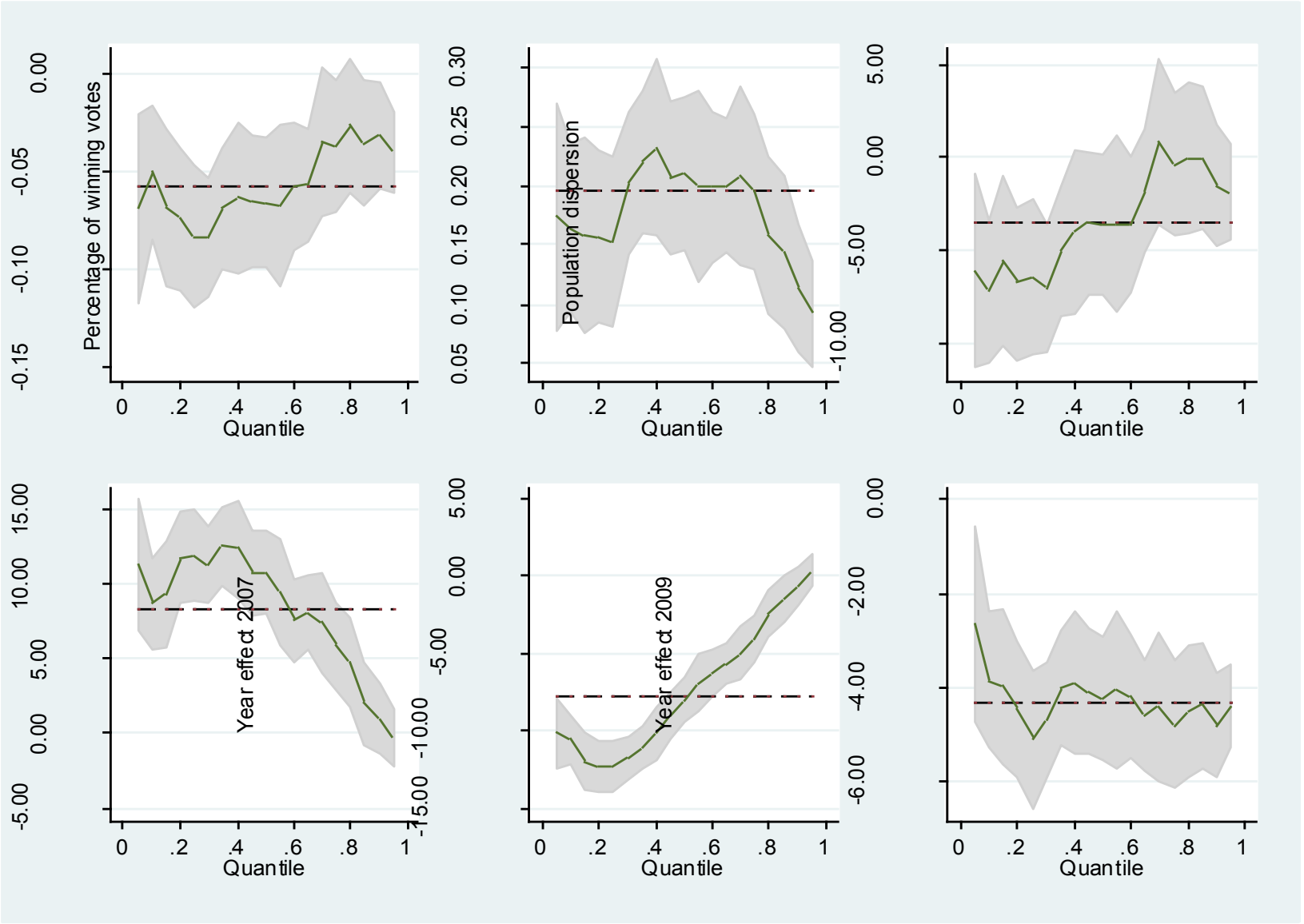
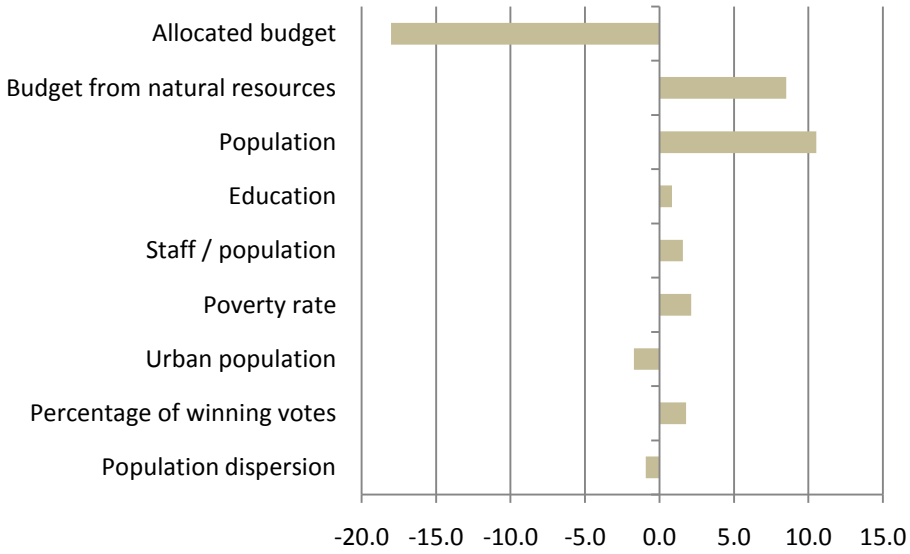


Figure 3 (cont'd)



The preceding discussion has focused on the statistical significance of the proposed determinants of the budget execution rate. To be sure, most of them appear to be statistically relevant. Now, in order to ascertain their quantitative importance, we use the estimated coefficients from the basic specification to gauge the effect that a one-standard-deviation change in each variable has on the budget execution rate (for defined capital expenditures only). The results are presented in Figure 4. The most important variables driving the differences in budget execution rates across municipalities are the size of the allocated budget itself, the share of the budget whose source is natural resource exploitation, and the population of the district. The importance of these variables highlights the connection between budget size and local capacity in determining the municipalities' ability to use the funds that are allocated to them.

Figure 4: Quantitative Importance of Basic Determinants of Budget Execution Rates for Defined Capital Expenditures



Note: the effect of each variable is derived multiplying its estimated coefficient in Table 1 times one standard deviation of the variable in the regression sample.

Given the importance of the budget itself on driving the capacity to spend it, in Table 3 we explore further aspects of the budgetary process. We do it only for defined capital

expenditures, which, as mentioned above, suffer the most from low execution rates. In column 1, we add a measure of the typical size of a capital expenditure project in the municipality. It carries a negative and significant coefficient, suggesting that municipalities facing more ambitious projects have a harder time implementing them given their capacity constraints. With the inclusion of this variable, the size of the coefficient on the allocated budget is somewhat reduced. In column 2, we add the proportional change in the allocated budget from the previous to the current year. Its coefficient is also negative and statistically significant, indicating that not only the size of the budget is relevant but also how much it increases over time. In the last few years, Peru has undergone a process of economic growth of unprecedented high rates. This has generated a large and growing flow of resources to the public sector, which especially the local governments have found difficult to absorb. Note that, again, the size of the coefficient on the allocated budget is a bit reduced.

In column 3, we add a measure of the proportional increase that the budget may have during the current year, with respect to the initial plan. Contrary to expectations, this variable is not statistically significant. In our interviews with local authorities, we learned that the initial budget is usually modified along predictable lines (e.g., by including sources of revenue with systematic patterns), which would explain its lack of a significant effect on the capacity to plan and implement capital expenditures. In column 4, we consider the issue of over-time improvement in the capacity to use the municipal budget. We do so by interacting year dummy variables with the measure of allocated budget. The year dummies correspond to 2007 and 2009, and, therefore, the coefficients on the corresponding interactions represent the differences with respect to the budget effect in 2008. The coefficient on the 2007 interaction is negative and statistically significant, while the coefficient on the 2009 interaction is significantly positive. That is, in 2008 the negative effect of the budget size was smaller in magnitude than in 2007 but larger than in 2009. This reveals an improvement over time in the municipal ability to handle a given budget size.

Table 3: Extended Model of Determinants of the Municipal Budget Execution Rate

	Dependent Variable: Actual Expenditure / Allocated Budget (%)			
Explanatory variables:	Capital Defined			
Allocated Budget (LCU, in logs)	-11.8088*** (-12.60)	-10.4043*** (-11.25)	-10.5271*** (-11.56)	-10.5733*** (-10.47)
Projects' Size (in terms of budget, median by district, in logs)	-3.5289*** (-7.98)	-3.6741*** (-8.42)	-3.6614*** (-8.35)	-3.2599*** (-7.42)
Change in Budget (log differences of budget)		-4.4495*** (-5.82)	-4.6667*** (-6.10)	-3.9132*** (-5.09)
Within-Year Budget Increase ([modified budget – initial budget] / initial budget)			0.1582 (0.78)	0.1286 (0.63)
Expenditure-Year Interaction (2007) (expenditure as budgeted * year dummy 2007)				-2.9253*** (-7.02)
Expenditure-Year Interaction (2009) (expenditure as budgeted * year dummy 2009)				1.1528** (2.26)
Budget from Natural Resources (% of actual expenditure)	0.3216*** (9.95)	0.2971*** (9.40)	0.3009*** (9.91)	0.3097*** (10.24)
Population (in logs)	7.0738*** (11.77)	6.2351*** (10.45)	6.3144*** (10.61)	6.5568*** (10.85)
Education (average years of schooling, population over 15 years old)	1.2680** (2.39)	1.3417** (2.54)	1.3408** (2.54)	1.2982** (2.48)
Staff / Population (ratio of white-collar staff in municipality to population, %)	3.0396*** (3.03)	2.2110** (2.33)	2.2515** (2.36)	2.4375** (2.52)
Poverty Rate (% of total population)	0.0864*** (3.85)	0.0834*** (3.78)	0.0845*** (3.85)	0.0865*** (3.92)
Urban Population (% of total population)	-0.0646*** (-2.99)	-0.0608*** (-2.88)	-0.0610*** (-2.89)	-0.0623*** (-2.94)
Percentage of Winning Votes (% of votes obtained by winning Mayor)	0.2057*** (4.32)	0.2019*** (4.37)	0.2013*** (4.37)	0.2023*** (4.35)
Population Dispersion (1 – normalized Herfindahl index of population in villages)	-4.8330** (-2.11)	-4.5725** (-2.02)	-4.6325** (-2.05)	-4.6557** (-2.06)
Incumbent Mayor (dummy variable = 1 if incumbent, and 0 otherwise)	-1.2359 (-1.24)	-1.5395 (-1.52)	-1.5537 (-1.55)	-1.3992 (-1.42)
Incumbent Mayor * Year Effect 2007	8.6224*** (8.08)	9.2615*** (8.73)	9.2814*** (8.77)	9.1482*** (9.05)
Year Effect 2007 (dummy variable = 1 if year is 2007, and 0 otherwise)	-5.1392*** (-5.35)	-4.3864*** (-4.42)	-4.3392*** (-4.43)	37.6245*** (6.32)
Year Effect 2009 (dummy variable = 1 if year is 2009, and 0 otherwise)	-2.5512*** (-3.43)	-3.5599*** (-4.78)	-3.5623*** (-4.77)	-20.5333*** (-2.64)
Constant	191.3344*** (20.65)	181.3000*** (20.20)	181.9853*** (20.58)	176.5957*** (16.84)
R-squared	0.243	0.252	0.252	0.264
No. of observation / No. of municipalities	4858 / 1688	4858 / 1688	4858 / 1688	4858 / 1688

Numbers in parentheses are the corresponding robust t-statistics. Standard errors are clustered by province.
*, ** and *** denote significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Next we conduct quantile regression analysis on the extended model. The results are presented in Figure 5. There, we include plots for the new budget-related variables, as well as for the variable on allocated budget. The remaining variables of the extended model are included in the analysis but not in the graphical presentation of results, as they are quite similar to those in Figure 3.

For the variables on projects' size, (year-to-year) change in budget, as well as allocated budget, the estimated effects become smaller in magnitude as the budget execution rate gets larger. This is similar to what we found as a general pattern in the basic specification. For the variable on within-year budget increase, the quantile regressions display a rather different pattern. This variable carried a small and non-statistically significant coefficient under OLS estimation; quantile analysis shows that this mean effect is in fact masking a heterogeneous impact according to the degree of budget execution: for municipalities where budget execution is weak, an increase in budget within the year leads to smaller execution, and *vice versa* for municipalities that do not suffer from this problem. Finally, for the expenditure-year interactions, the quantile regression coefficients are not statistically different from the mean (OLS) coefficients in a discernible way.

Figure 5: Quantile Regression on Extended Specification

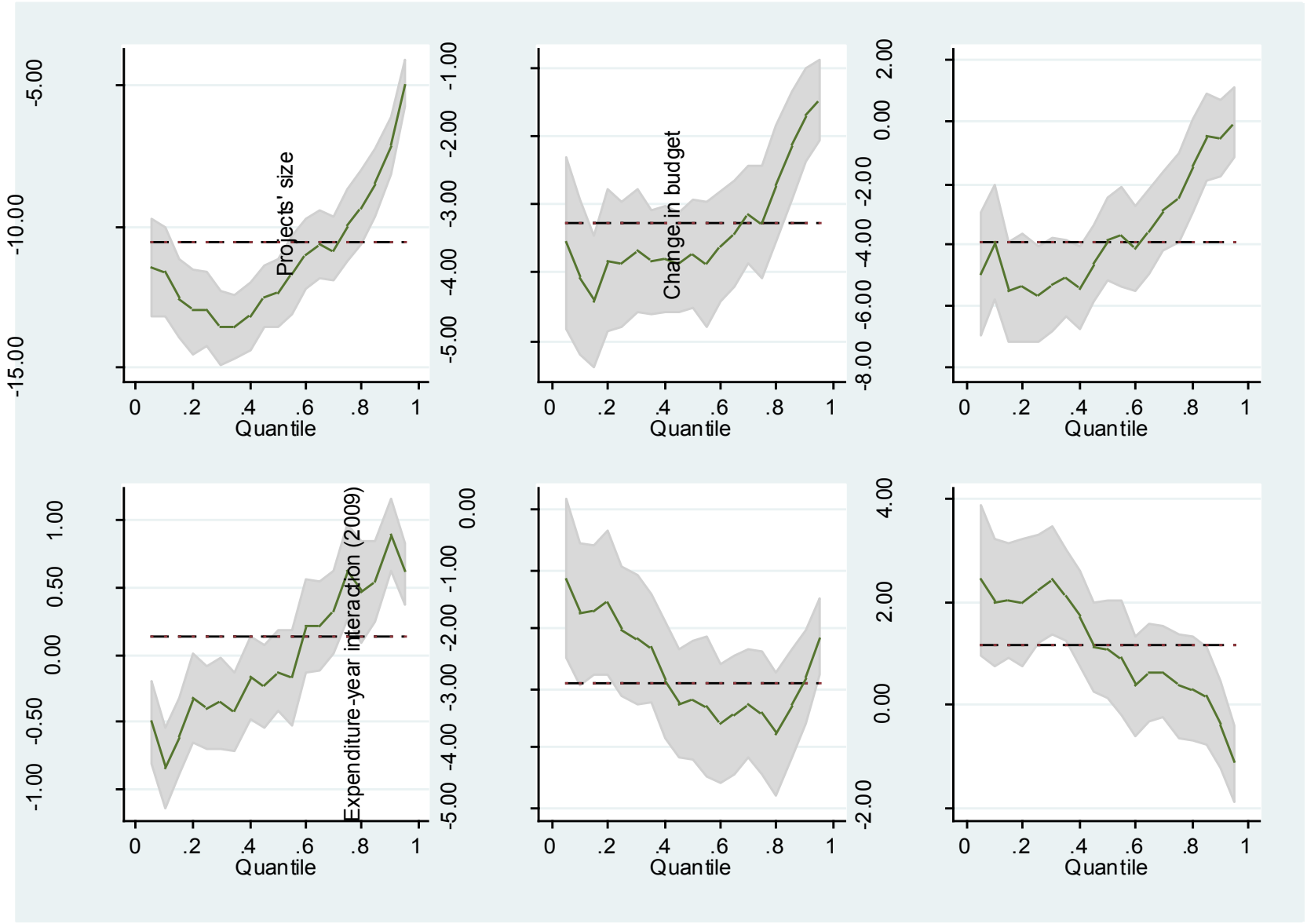
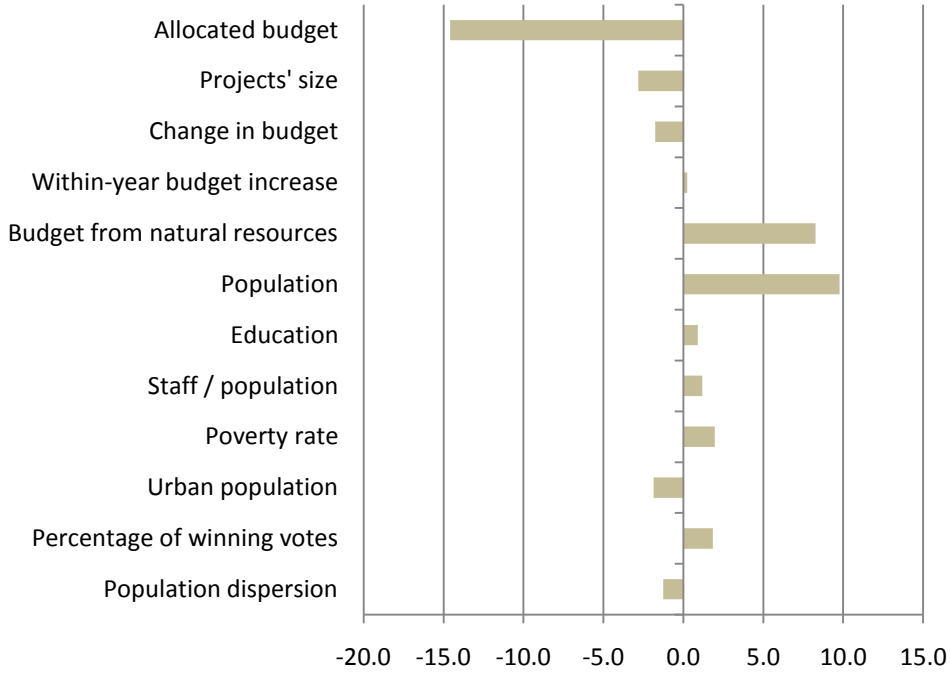


Figure 6 repeats the quantitative exercise presented in Figure 4, but considering also the new budget-related variables introduced in Table 3. The importance of the budget size in driving the variation in capital budget execution rates across municipalities remains strong. However, the level of the allocated budget now shares some of its quantitative importance not only with its earmarked composition (i.e., natural resource based) but also with budget changes over time and the magnitude of typical capital expenditure projects.

Figure 6: Quantitative Importance of Budget Execution Rates in the Extended Model



Note: the effect of each variable is derived multiplying its estimated coefficient in Table 2 times one standard deviation of the variable in the regression sample.

V. Conclusions

The process of fiscal decentralization in Peru is widely regarded as a key step for improving the efficacy and governance of public service delivery in the country. In a period of high growth, as in recent years, much was expected from regional and municipal governments

because they had substantial financial resources at their disposal. It has been disappointing, however, to see that local governments have not been able to use fully their allocated budgets, especially regarding much needed capital investment projects. This paper contributes to understand the factors that determine a municipality's ability to use the resources at its disposal or, in simpler terms, to execute their budget. For this purpose, the paper links detailed information on the fiscal accounts of most municipalities in Peru with data on key economic, social, and political characteristics of their jurisdictions and their elected governments.

We study the execution rates of aggregate fiscal expenditure, as well as of its current and capital components, focusing on the latter because of its remarkably low execution rates. For analytical convenience, we separate the determinants of the budget execution rate in four broad categories, related to budget size and allocation process, local capacity, local needs, and political economy considerations. We find that all these groups contain independently relevant explanatory variables, at least in terms of statistical significance. Moreover, using quantile regression analysis, we find that the negative effects tend to be larger in magnitude for municipalities with weaker budget execution rates. Finally, focusing on the variables' quantitative impact, we must highlight the relevance of the budget size itself, its allocation rules, and the local capacity to absorb it.

It stands to reason that increasing municipalities' budgets without technical support and sustained capacity-building efforts is not wise policy. In Peru, and possibly in many other countries as well, effective fiscal decentralization can be achieved if budget allocations are matched not only with local needs, but also with local capacity. However, in the medium term local capacity itself can be the target of purposeful economic policy. Changing the incentives for local leaders to hire better public managers, facilitating coordination between small municipalities for large common projects, and clarifying the different mandates of different levels of government are but a few elements of much needed, second-generation fiscal decentralization reforms.

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Appendix: Descriptive Statistics

A) Total Expenditure

Variable	Year	Obs.	Max	Median	Mean	Min	Std. Dev.
Actual Expenditure / Allocated Budget (%)	2007	1565	100.00	75.73	72.77	4.73	18.22
	2008	1619	99.64	78.29	75.72	16.24	15.82
	2009	1674	99.71	76.29	73.89	15.74	14.70
	2007-09	4858	100.00	76.95	74.14	4.73	16.31
Allocated Budget (in logs)	2007	1565	20.93	14.86	15.03	13.02	1.19
	2008	1619	20.97	15.09	15.24	13.07	1.22
	2009	1674	21.12	15.26	15.39	13.24	1.23
	2007-09	4858	21.12	15.06	15.22	13.02	1.23
Change in Budget	2007	1565	1.74	0.28	0.35	-0.94	0.35
(log differences of budget)	2008	1619	1.76	0.22	0.22	-0.90	0.28
	2009	1674	1.91	0.13	0.16	-1.42	0.31
	2007-09	4858	1.91	0.20	0.24	-1.42	0.33

B) Current Expenditure

Variable	Year	Obs.	Max	Median	Mean	Min	Std. Dev.
Actual Expenditure / Allocated Budget (%)	2007	1565	100.00	92.17	89.60	7.90	10.03
	2008	1619	100.00	91.13	88.31	5.33	10.33
	2009	1674	100.00	85.08	83.20	18.77	11.43
	2007-09	4858	100.00	89.61	86.97	5.33	10.98
Allocated Budget (in logs)	2007	1565	20.17	13.50	13.76	11.79	1.27
	2008	1619	20.21	13.64	13.89	11.93	1.28
	2009	1674	20.24	13.82	14.03	12.01	1.29
	2007-09	4858	20.24	13.66	13.90	11.79	1.29
Change in Budget	2007	1565	2.27	0.15	0.18	-0.88	0.26
(log differences of budget)	2008	1619	2.00	0.12	0.14	-1.89	0.23
	2009	1674	1.60	0.15	0.17	-0.93	0.22
	2007-09	4858	2.27	0.14	0.16	-1.89	0.24

C) Capital Expenditure

Variable	Year	Obs.	Max	Median	Mean	Min	Std. Dev.
Actual Expenditure / Allocated Budget (%)	2007	1565	100.00	67.44	65.17	3.89	23.01
	2008	1619	99.80	73.69	71.06	9.74	18.95
	2009	1674	100.00	72.44	70.51	12.49	17.48
	2007-09	4858	100.00	71.71	68.97	3.89	20.06
Allocated Budget (in logs)	2007	1565	20.30	14.43	14.59	12.05	1.18
	2008	1619	20.35	14.73	14.86	12.31	1.23
	2009	1674	20.59	14.91	15.01	12.43	1.24
	2007-09	4858	20.59	14.69	14.83	12.05	1.23
Change in Budget	2007	1565	2.73	0.36	0.44	-1.19	0.48
(log differences of budget)	2008	1619	2.27	0.27	0.28	-1.20	0.39
	2009	1674	2.52	0.11	0.17	-1.69	0.42
	2007-09	4858	2.73	0.23	0.29	-1.69	0.44

D) Capital Expenditure (Defined)

Variable	Year	Obs.	Max	Median	Mean	Min	Std. Dev.
Actual Expenditure / Allocated Budget (%)	2007	1565	100.00	66.19	64.34	3.89	23.45
	2008	1619	99.72	69.84	67.85	8.14	19.77
	2009	1674	100.00	64.62	63.19	9.42	18.70
	2007-09	4858	100.00	66.83	65.11	3.89	20.77
Allocated Budget (in logs)	2007	1565	20.25	14.36	14.46	11.27	1.31
	2008	1619	20.31	14.63	14.70	10.60	1.38
	2009	1674	20.38	14.69	14.70	9.25	1.41
	2007-09	4858	20.38	14.55	14.62	9.25	1.37
Change in Budget	2007	1565	2.73	0.33	0.38	-1.59	0.54
(log differences of budget)	2008	1619	2.73	0.25	0.25	-1.86	0.45
	2009	1674	2.74	0.01	0.02	-3.01	0.44
	2007-09	4858	2.74	0.17	0.21	-3.01	0.50

E) Other Variables

Variable	Obs.	Max	Median	Mean	Min	Std. Dev.
Projects' Size (in logs)	4858	12.72	8.95	8.98	2.30	0.91
Within-Year Budget Increase	4858	83.58	0.99	1.47	-0.77	2.49
Budget from Natural Resources (%)	4858	98.30	29.71	32.98	0.00	26.17
Population (in logs)	1688	15.83	8.48	8.67	5.50	1.48
Education (average yrs of schooling)	1688	5.33	2.27	2.34	0.40	0.70
Staff / Population (%)	4858	9.59	0.26	0.37	0.00	0.46
Poverty Rate (%)	1688	99.72	62.40	58.73	1.26	22.67
Urban Population (%)	1688	100.00	40.92	46.61	1.31	29.89
Percentage of Winning Votes (%)	1688	77.06	27.19	28.70	6.83	9.05
Population Dispersion	1688	1.00	0.88	0.78	0.00	0.27
Incumbent Mayor	1688	1.00	0.00	0.21	0.00	0.41